

WHAT IS CLAIMED IS:

1. A method of determining a phase offset between signaling
channels in a communication system, comprising the steps of:
 deriving a first set of channel estimates from symbols received through a
5 first signaling channel;
 deriving a second set of channel estimates from symbols received through
a second signaling channel; and
 determining an estimate of the phase offset based on the first and second
sets of channel estimates.

10 2. The method of claim 1, wherein the first and second signaling
channels are pilot channels.

15 3. The method of claim 1, wherein the first and second signaling
channels are a DPCH and CPICH, respectively.

20 4. A method of determining a set of complex channel estimates for a
transmission channel in a communication system, comprising the steps of:
 deriving a first set of channel estimates from symbols received through a
first signaling channel;
 deriving a second set of channel estimates from symbols received through
a second signaling channel;
 determining a phase offset between signaling channels in the
communication system based on the first and second sets of channel estimates;
25 and
 determining the set of complex channel estimates based on the phase
offset and a first set of channel estimates.

5. The method of claim 4, wherein the phase offset value φ is determined by choosing φ among a set of predetermined feasible choices of φ that minimizes the following expression:

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$$\min_{\varphi \in \{\pi/4, 3\pi/4, 5\pi/4, 7\pi/4\}} \sum_{i=1}^n \frac{(\hat{\alpha}_i - \hat{\beta}_i + \varphi)^2}{\sigma_{ei}^2}$$

where:

10 $i \in [1, n]$ is a rake finger number of the receiver, and
 $\hat{\alpha}$ and $\hat{\beta}$ are respective antenna phase estimates derived from the first and second sets of channel estimates, and
 σ_{ei} is related to the power of interference.

15 6. The method of claim 5, wherein the complex channel estimate is determined by performing a linear combination of the first and second set of channel estimates.

7. A channel estimator adapted to operate with a receiver in a
20 communication system to determine a set of complex channel estimates for a transmission channel of the communication system, the channel estimator comprising:

means that derive a first set of channel estimates from symbols received through a first signaling channel;

25 means that derive a second set of channel estimates from symbols received through a second signaling channel;

means that determine a phase offset between signaling channels in the communication system based on the first and second sets of channel estimates; and

30 means that determine the set of complex channel estimates based on the phase offset and a first set of channel estimates.

8. The channel estimator of claim 7, wherein the means that determine a phase offset comprise:

means that de-rotate the symbols received through the first and second signaling channels;

5 means that filter the de-rotated symbols;

means that convert the filtered de-rotated symbols to polar representations;

means that calculate the phase estimate according to the polar representations.

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9. The channel estimator of claim 8, wherein the phase offset is value φ is calculated by choosing φ among a set of predetermined feasible choices of φ that minimizes the following expression:

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$$\min_{\varphi \in \{\pi/4, 3\pi/4, 5\pi/4, 7\pi/4\}} \sum_{i=1}^n \frac{(\hat{\alpha}_i - \hat{\beta}_i + \varphi)^2}{\sigma_{ei}^2}$$

where:

20 $i \in [1, n]$ is a rake finger number of the receiver, and

$\hat{\alpha}$ and $\hat{\beta}$ are respective antenna phase estimates derived from the first and second sets of channel estimates, and

σ_{ei} is related to the power of interference.

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10. The channel estimator of claim 7, wherein the set of complex channel estimates is determined by performing a linear combination of the first and second set of channel estimates.

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11. The channel estimator of claim 7, wherein the receiver is a RAKE receiver.

12. The channel estimator of claim 7, wherein the receiver operates in a cellular communication system.

13. The channel estimator of claim 7, wherein the first and second
5 signaling channels are received by the receiver after transmission using transmit diversity.

14. User equipment for a communication system, the user equipment adapted to determine a set of complex channel estimates for a transmission
10 channel of the communication system, the user equipment comprising:
 means that derive a first set of channel estimates from symbols received through a first signaling channel;
 means that derive a second set of channel estimates from symbols received through a second signaling channel;
15 means that determine a phase offset between signaling channels in the communication system based on the first and second sets of channel estimates; and
 means that determine the set of complex channel estimates based on the phase offset and a first set of channel estimates.

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15. The user equipment of claim 14, wherein the means that determine a phase offset comprise:
 means that de-rotate the symbols received through the first and second signaling channels;
25 means that filter the de-rotated symbols;
 means that convert the filtered de-rotated symbols to polar representations;
 means that calculate the phase estimate according to the polar representations.

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16. The user equipment of claim 14, wherein the phase offset is value φ is calculated by choosing φ among a set of predetermined feasible choices of φ that minimizes the following expression:

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$$\min_{\varphi \in \{\pi/4, 3\pi/4, 5\pi/4, 7\pi/4\}} \sum_{i=1}^n \frac{(\hat{\alpha}_i - \hat{\beta}_i + \varphi)^2}{\sigma_{ei}^2}$$

where:

10 $i \in [1, n]$ is a rake finger number of the receiver, and

$\hat{\alpha}$ and $\hat{\beta}$ are respective antenna phase estimates derived from the first and second sets of channel estimates, and

σ_{ei} is related to the power of interference.

15 17. The user equipment of claim 14, wherein the set of complex channel estimates is determined by performing a linear combination of the first and second set of channel estimates.